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DOCKET NUMBER: DE919990090US1
November 28, 2000

Sir:

Transmitted herewith for filing is the Patent Application of:

Inventors: MANFRED BOLDY

For: **ACTUATING DEVICE FOR MINIATURE KEYBOARDS**

Enclosed are:

- ☒ Patent Specification and Declaration
- ☒ 3 sheets of drawing(s).
- ☒ An assignment of the invention to International Business Machines Corporation (includes Recordation Form Cover Sheet).
- ☒ A certified copy of a German application., Application No. 199 57 631.9
- ☐ Information Disclosure Statement, PTO 1449 and copies of references.

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09/724040
11/28/00

The filing fee has been calculated as shown below:

For	Number Filed	Number Extra	Rate	Fee
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Total Claims	11	- 20	0 x 18 =	\$
Indep. Claims	1	- 3	0 x 80 =	\$
MULTIPLE DEPENDENT CLAIM PRESENTED			x 260 =	\$
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ACTUATING DEVICE FOR MINIATURE KEYBOARDS**BACKGROUND OF THE INVENTION**

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1. Technical Field:

10 The invention concerns an actuating device for miniature keyboards or input tablets with an actuating element which is shaped in the form of a pen and has a tip adapted to the size of the keys or tablet fields, in particular for use with palmtop computers.

2. Description of the Related Art:

20 Miniaturized electronic devices such as palmtop computers, input tablets, watches, medical equipment and suchlike have miniature keys or input panels which, as a result of the mismatch in size between the touch area and the width of the finger, are in some cases difficult to operate. In order to enable safe actuation of miniature keyboards, specially adapted pens are used. The actuation
25 of keys with pens of this kind is, however, awkward and time-consuming.

30 A miniaturized interface device wearable on the finger to generate a digital input into information processing devices is also known (US Patent 4,954,817). The device has a finger palette and a stylus ring which are worn on various fingers and which in their interaction perform the function of a digital input tablet and a conventional mouse input device. For this,

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SUMMARY OF THE INVENTION

An object of the invention is to provide a simple and user-friendly actuating device for miniature keyboards or miniature input tablets.

A further object of the invention is to provide an actuating device for miniature keyboards or miniature input tablets which is worn on the finger, which is light in weight, and which does not place a strain on the fingers and hand and does not impede the movement of the fingers.

A further object of the invention is to provide an actuating device for miniature keyboards or miniature input tablets which is worn on the finger and which permits quick and uncomplicated fitting on and removal from the finger.

In accordance with the invention as defined in the Claims, a dome-shaped body is adapted to the curve of the fingertip and fitted to the fingertip by means of a removable adhesive bond. The dome-shaped body has a pin-shaped projection on its convex side which serves as the actuating element. The dome-shaped body is made of a soft plastic material which molds to the fingertip. On the concave side of the dome is an adhesive layer which permits repeated fitting and removal of the dome to and from the fingertip.

The device in accordance with the invention is suitable for actuation of miniaturized keyboards and for

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BRIEF DESCRIPTION OF THE DRAWINGS

Various embodiments of the invention are described in the following on the basis of drawings:

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Figure 1 shows a schematic view of a human finger fitted with the actuating device in accordance with the invention.

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Figure 2 shows a perspective of a first embodiment of the device in accordance with the invention.

Figure 3 shows a section through the device as shown in **Figure 2**.

Figure 4 shows a section through a further embodiment of the device in accordance with the invention.

Figure 5 shows a perspective of the device as shown in **Figure 4**.

Figure 6 shows a section through a third embodiment of the device in accordance with the invention.

25

Figure 7 shows a perspective of the device as shown in **Figure 6**.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Figure 1 shows a schematic view of a human finger with an actuating device **10** fitted to the fingertip. The embodiment of the actuating device **10** in accordance with the invention presented in **Figures 2** and **3** comprises a dome **12**, a pin **14** and the convex outer side **15** of the dome **12** and a thin layer **18** applied to the concave inside **16** of the dome **12**, said thin layer having an adhesive coating. The dome **12** is preferentially circular around its circumference and is made of a soft plastic material such as polyethylene or PVC, which adapts itself to the shape of the fingertip. The pin **14** is rotationally symmetric and is manufactured as a separate part. It is made of a harder plastic, which may likewise be polyethylene or PVC. The pin **14** is widened at its base and is inserted into an opening in the dome **12** and permanently joined to it, wherein its base surface **17** is adapted to the concave surface **16** of the dome **12** and forms one surface with it. In this position the pin **14** is permanently joined to the dome **12** and the layer **18**.

The dome **12** is made of a fine-pored synthetic foam, such as Styrofoam from Dow Chemical, or any standard commercially available mousse foam. The layer **18** is an adhesive bonded layer. A standard commercially available adhesive which permits repeated removal and refitting in the manner of a sticking plaster is suitable as the bonding agent. The layer **18** also has a large number of small perforations **19** which serve to absorb deposits of

perspiration on the fingertip.

For use, the dome **12** is fitted on the finger and pressed on, and adheres to the fingertip by means of the adhesive layer. For one-handed operation of miniature electronic devices such as palmtop computers or mobile phones, the dome **12** is preferentially fitted on the thumb, since the thumb is able to cover a wide range of movement and permits positioning of the pin **14** on the keys of the device. The free end of the pin **14** is adapted to the shape of the keys being pressed, and may be pointed or rounded or have a small flattening on its tip. On every press of a key the dome **12** is pressed back onto the tip of the thumb, so that a safe fitting of the dome on the finger is ensured. The dome **12** may instead also be fitted on the tip of the index finger in order to enable two-handed operation or to operate miniaturized input tablets. A number of domes **12** can also be fitted simultaneously on several fingers. Since the domes are small in area, mutual impeding of the fingers as a result of the fitted domes is largely avoided.

Figures 4 - 7 show further embodiments of the invention. In the embodiment of the invention as presented in **Figures 4** and **5**, a dome **20** and a pin **22** are formed as one combined part made of a plastic material such as polyethylene or PVC. The hardness of this material is chosen such that it molds to the shape of the fingertip but is still hard enough for the pin **22** to perform its function as an actuating element. The dome **20** is preferentially manufactured as a rotationally

symmetric molding and on its inside facing the finger forms a bell-shaped cavity **24**. The pin **22** has at its base a funnel-shaped extension **25** which ends at the rim **21** of the dome and forms a further cavity **26**. In the area of the rim **21** of the dome a ring-shaped layer **28** is affixed, corresponding to the layer **18** in **Figures 2** and **3**. The layer comprises a fine-pored synthetic foam and bears an adhesive coating which permits repeated removal and rebonding.

When the dome **20** is fitted on the fingertip a vacuum is created in the cavities **24** and **26** which generates a suction effect in the two cavities **24** and **26**. This supports the adhesive power of the adhesive layer **28** and additionally stabilizes the pin **22** when the device is in use, thereby assisting the safe fitting of the dome **20** on the finger. The embodiment of the invention as shown in **Figures 4** and **5** is characterized in particular by its light weight.

In the embodiment of the invention as shown in **Figures 6** and **7**, a dome **30** and a pin **32** are formed as a single part made of a plastic material, such as polyethylene or PVC, as in the embodiment of the invention shown in **Figures 4** and **5**. The dome **30** is manufactured as a rotationally symmetric molding, shaped like a bell with a relatively thin wall **34**. In the central part of the dome **30** the wall **34** merges into the pin **32**. In the area of the rim **31** of the dome a ring-shaped layer **36** is affixed, corresponding to the layer **28** in **Figures 4** and **5**. The layer is formed as an adhesive

bonding layer and permits repeated removal and rebonding. On the concave side of the dome **30** is a lenticular felt inlay **38** which fills out the interior of the bell and stabilizes the dome **30** and the position of the pin **32**.

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When the dome **30** is fitted on the fingertip the adhesive layer **28** bonds to the finger. By pressing the dome **30** onto the finger the felt inlay **38** is compressed to a certain extent, thereby creating a vacuum in the area surrounding the felt inlay **38** which generates a suction force which in turn assists the adhesive power.

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The invention has been described on the basis of embodiments of the invention. Derivations of the embodiments shown and described, or other embodiments of the invention, lie within the framework of the following Claims.

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CLAIMS

What is claimed is:

1 1. An actuating device for miniature keyboards and
2 input tablets, comprising:

3 an actuating element adapted to the size of keys and
4 tablet fields of palmtop computers, the actuating element
5 having a dome (12) adapted to the curve of a fingertip
6 such that the dome can be fitted to the fingertip by
7 means of a removable adhesive bond, and wherein the dome
8 has a pin-shaped projection (14) on a convex side which
9 serves as an actuating member.

1 2. The actuating device in accordance with Claim 1,
2 wherein the dome (12) is made of a soft plastic material
3 which molds to the fingertip.

1 3. The actuating device in accordance with Claim 1,
2 wherein a concave side of the dome (12) is joined to an
3 adhesive layer (18) which permits repeated fitting and
4 removal of the dome to and from the fingertip.

1 4. The actuating device in accordance with Claim 3,
2 wherein the adhesive layer (18) is perforated.

1 5. The actuating device in accordance with Claim 1,
2 wherein a concave side of the dome is joined to a ring-
3 shaped layer (28) which bears an adhesive material, and
4 the dome forms a cavity (24) within the ring-shaped layer

5 that acts as a suction cup when the dome is fitted on the
6 fingertip.

1 6. The actuating device in accordance with Claim 5,
2 wherein a circumference of the dome is circular in shape.

1 7. The actuating device in accordance with Claim 5,
2 wherein the pin-shaped projection (22) has a funnel-
3 shaped extension (25) that protrudes into the cavity (24)
4 as far as the rim (21) of the dome to form another cavity
5 (26) that acts as another suction cup when the dome is
6 fitted on the fingertip.

1 8. The actuating device in accordance with Claim 5,
2 wherein the dome (20, 30) and the pin-shaped projection
3 (22, 32) are manufactured as one piece.

1 9. The actuating device in accordance with Claim 1,
2 wherein, in order to form the pin-shaped projection (14),
3 a pin is inserted into an opening in the dome (12) and
4 joined to the dome (12) and to an adhesive layer (18).

1 10. The actuating device in accordance with Claim 1,
2 wherein the dome (30) is joined on a concave side to a
3 ring-shaped layer (36) which bears an adhesive material,
4 and that the dome forms a bell-shaped chamber within the
5 ring-shaped layer which is filled out by an inlay (38)
6 made of a felt-type material.

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- 2
- 3
- 4

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ABSTRACT OF THE DISCLOSURE

ACTUATING DEVICE FOR MINIATURE KEYBOARDS

5 The invention concerns a simple and user-friendly
actuating device (10) for miniature keyboards or
miniature input tablets. The device has of a dome-shaped
body (12) which is adapted to the curve of the fingertip
and fitted to the fingertip by means of a removable
10 adhesive bond. The dome-shaped body has a pin-shaped
projection (14) on its convex side which serves as the
actuating element. The dome-shaped body is made of a soft
plastic material which molds to the fingertip. On the
concave side of the dome is an adhesive layer (18) which
5 permits repeated fitting and removal of the dome to and
from the fingertip.

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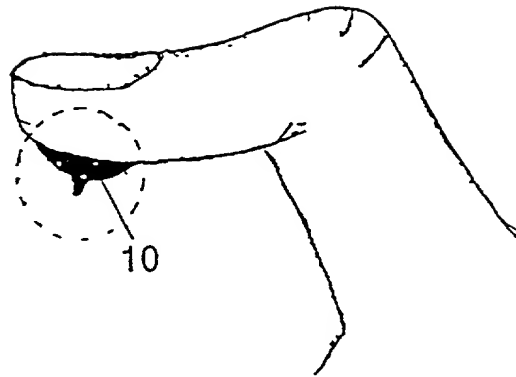


FIGURE 1

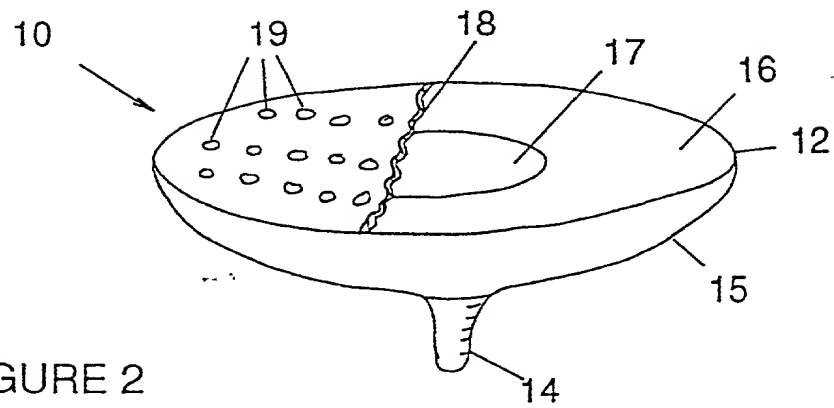


FIGURE 2

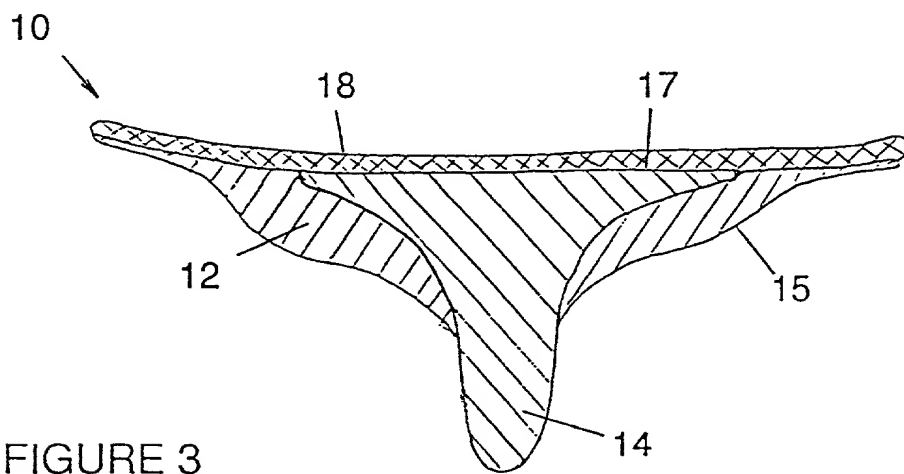


FIGURE 3

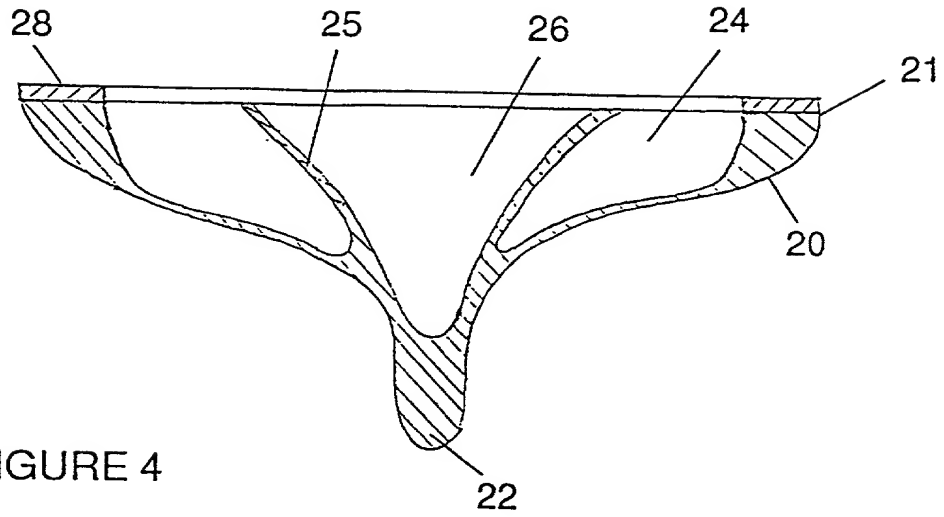


FIGURE 4

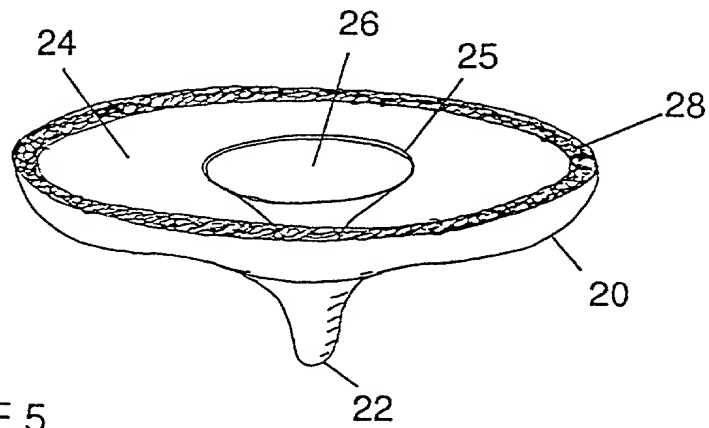


FIGURE 5

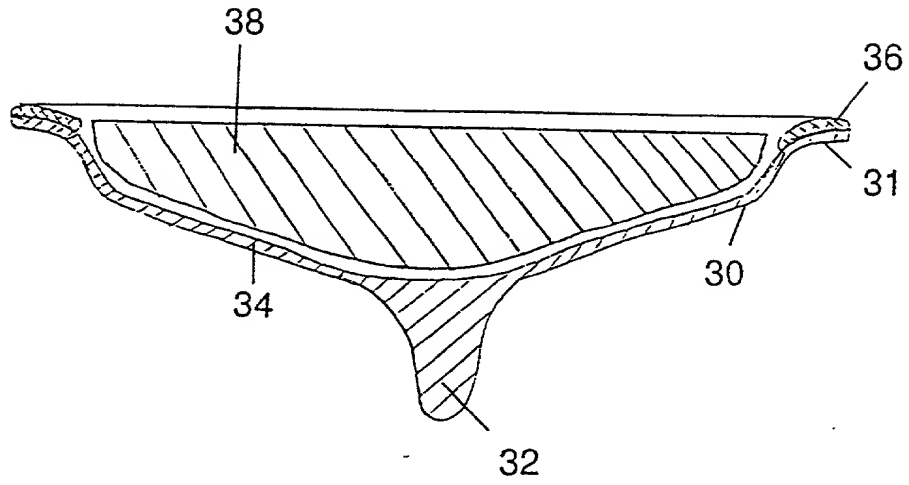


FIGURE 6

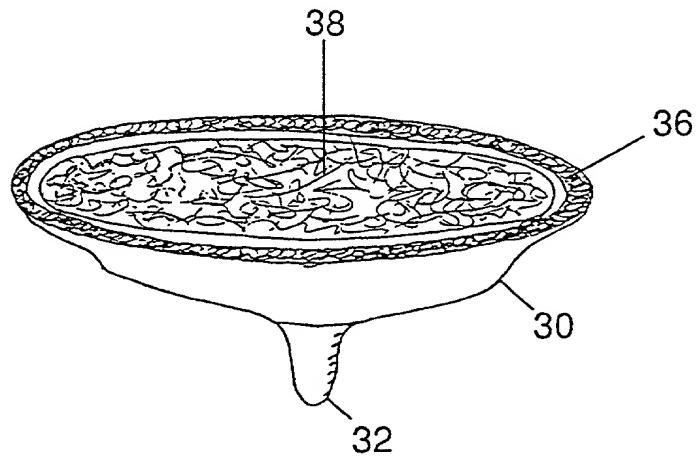


FIGURE 7

PATENT APPLICATION

My residence, post office address and citizenship are as stated below next to my name;

ACTUATING DEVICE FOR MINIATURE KEYBOARDS

X is attached hereto.

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to the patentability of this application in accordance with Title 37, Code of Federal Regulations, §1.56.

I hereby claim foreign priority benefits under Title 35, United States Code, §119 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

Prior Foreign Application(s) : Priority Claimed

199 57 631.9 Federal Republic of Germany 30 November 1999 X Yes ___ No
(Number) (Country) (Day/Month/Year)

I hereby claim the benefit under Title 35, United States Code, §120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, §112, I acknowledge the duty to disclose information material to the patentability of this application as defined in Title 37, Code of Federal Regulations, §1.56 which occurred between the filing date of the prior application and the national or PCT international filing date of this application:

(Application Serial #)	(Filing Date)	(Status)
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DOCKET NUMBER: DE919990090US1

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

POWER OF ATTORNEY: As a named inventor, I hereby appoint the following attorneys and/or agents to prosecute this application and transact all business in the Patent and Trademark Office connected therewith.

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